

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### Improvements in or relating to means for Varying the Optical Nature of a Beam Emitted by a Source of Light

We, THE SUNBEAM MANUFACTURING COMPANY LIMITED, a Company incorporated under the Hong Kong Companies Ordinance, of 224—240, Castle Peak Road, Kowloon, Hong Kong, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to means for varying the beam emitted by a source of light so that it shall be either diffused or relatively concentrated. The invention is mainly, although not necessarily exclusively, applicable to torches, flashlights, bicycle lamps, or similar devices, wherein the source of light is constituted by an electric bulb supplied from a battery. The invention might, however, be applied to the case in which the lamp is supplied from normal supply mains, or indeed, in which the source of light is other than an electric bulb.

20 The invention essentially consists in the combination with a source of light of a lens having a central convex portion surrounded by a plane annular portion, a reflector of such form as to direct rays from the source of light through the annular portion of the lens in a substantially concentrated beam and an opaque shield movable in order to cut off rays from the source of light to the reflector, or to allow such rays to impinge on the reflector. Suitably the central convex portion of the lens is of plano-convex contour, but it might be made of double convex or even concavo-convex form. In any case, the annular portion of the lens is of uniform thickness so that rays passing through it in a direction normal to the surface will suffer no change of direction.

45 The lens may be made of glass or any other appropriate transparent material, colourless or tinted as desired. The reflector may be of metal or other material whereof the surface is of a suitably reflective nature, and is preferably parabolic in contour, the light

source being situated at the focus so that rays of light from the source are directed from the reflector through the plane annular portion of the lens to constitute a substantially parallel beam, thus providing a spot-light effect. Alternatively, the reflector might be so shaped as to give rise to a convergent beam.

50 If flood-lighting be desired, the rays emitted from the source of light through the central convex portion of the lens only are employed, and for this purpose the opaque shield is brought into the position in which it prevents any rays from the source reaching the reflector. The shield is suitably in the form of a hollow cylinder or frustum of a cone, being mounted so that it surrounds the source of light and occludes the rays which would otherwise reach the reflector, or may be withdrawn to an inoperative position. In its occluding position, one end of the cylinder is in contact with or in proximity to the lens, its diameter at this end being substantially equal to that of the central convex portion of the latter. The distance of the lens from the source of light is such that, under these conditions, a diverging beam will emerge from the lens, producing a flood-lighting effect. If desired, the inside surface of the shield may be polished so as to augment the intensity of light transmitted through the convex portion of the lens when the shield is in its occluding position.

80 In order that the invention may be clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying drawing, which illustrates, purely by way of example, a hand torch incorporating the invention, and wherein:—

Figure 1 is a section of the torch with the shield in its inoperative position, and

Figure 2 is a similar view showing the shield in operation.

90 Referring to the drawing, the torch consists of a casing 1 of metal or other suitable

[Price 3s. 6d.]

material and of normal more or less cylindrical shape. In proximity to one end of this casing there is fitted a disc 2, suitably made of metal or of other appropriate substance, such as one of the materials known as plastics, and serving to support a socket 3 for an electric bulb 4. As is usual in such constructions, the battery for supplying the lamp is carried within the casing 1 and an on-and-off switch 5 of conventional pattern is fitted in its wall, a connection from the socket 3 being led through a slot in the disc 2 as indicated. As this switch forms no part of the present invention, further description thereof is unnecessary.

Attached to the casing 1 by a screw thread 6 is a cap 7 also of metal or other appropriate material, this cap serving to support the lens 8, formed, as indicated, with a central plano-convex portion 9, surrounded by an annular portion 10, which is of uniform thickness. This lens may be made in one piece or may be constituted by a plate of glass or the like to which a plano-convex transparent lenticular element is attached to constitute the central section 9. Supported on the inner side of the lens 8 and having substantially the same diameter, is a reflector 11 of metal or other suitable material capable of receiving a polished surface, this reflector being preferably, and in the example illustrated, of parabolic form and such that the filament of the lamp 4 is located at its focus. As indicated, the reflector 11 is of annular form, and through its central aperture lying immediately behind the lamp 4 there extends a shield 12, made of metal or other opaque material and, in the example illustrated, in the form of a hollow conical frustum. The shield might, however, be equally well of cylindrical form.

This shield is mounted on one arm of an L-shaped bar 13, whereof the second arm extends through a slot 14 in the disc 2 and lies in proximity to the casing 1, being provided with a knob 15 extending through a slot in the casing. The bar is so mounted that, by means of the knob 15, it may readily be slid in a direction parallel to the axis of the casing so as to bring the shield 12 from its inoperative position, shown in Figure 1, to its operative position, depicted in Figure 2; thus in the former case rays from the lamp 4 will strike the reflector 11 and, as indicated, emerge through the annular portion 10 of the lens 8 as a parallel beam. When, however, the shield 12 is advanced to the position shown in Figure 2, no rays can reach the reflector 11 and, accordingly, light is emitted

from the lamp 4 solely through the central portion 9 of the lens 8 and is therefore in the form of a divergent beam as shown.

While for the sake of clarity the switch 5 and knob 15 have been shown in the drawing as on opposite sides of the casing 1, it may be desirable so to modify the position of these elements and the members immediately associated with them, such as the bar 13, that the switch 5 and knob 15 are relatively close together, thus affording ease of operation.

The lens and reflector may be made of any diameter appropriate to the power of the source of light and to the effective range of the resultant beam.

#### WHAT WE CLAIM IS:—

1. Means for varying the optical nature of a beam emitted by a source of light, comprising, in combination with the source of light, a lens having a central convex portion surrounded by a plane annular portion, a reflector of such form as to direct rays from the source of light through the annular portion of the lens in a substantially concentrated beam and an opaque shield movable in order to cut off rays from the source of light to the reflector or to allow such rays to impinge on the reflector.

2. Means as in Claim 1, wherein the lens is made in one piece of glass or other transparent material.

3. Means as in Claim 1, wherein the lens is constituted by a plate of glass or other transparent material to which a plano-convex transparent lenticular element is attached.

4. Means as in any of the preceding claims, wherein the reflector is of parabolic contour and the light source is situated at its focus.

5. Means as in any of the preceding claims, wherein the opaque shield is in the form of a hollow conical frustum or cylinder and means is provided for moving it from a position in which it does not occlude rays of light from the source to a position in which it encloses the source and one of its ends is substantially in contact with the lens.

6. Means as in Claim 5, wherein the reflector is of annular form having its central aperture lying immediately behind the source of light and the opaque shield extends through this aperture.

7. Means for varying the optical nature of a beam emitted by a source of light substantially as herein described with reference to the accompanying drawing.

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*This drawing is a reproduction of  
the Original on a reduced scale.*

